

What is claimed is:

1. An integrated granule product comprising a film having a plurality of ceramic coated granules bonded to said film by a cured adhesive.

2. The product of claim 1, wherein said product is pliable as determined by mandrel flexibility test procedures according to ASTM D-228-00.

3. The product of claim 1, wherein said film is a polymeric material.

4. The product of claim 1, wherein said cured adhesive is cured through the use of ultraviolet radiation, thermal radiation, actinic radiation, ionizing radiation, moisture activation, photo activation, or combinations thereof.

5. The product of claim 1, wherein said cured adhesive is flexible as indicated by a tensile elongation result of 25% or greater according to ASTM D-882.97.

6. ~~The product of claim 1, wherein said adhesive is selected from acrylated urethanes, multifunctional acrylate monomers, acrylated epoxies, acrylated polyesters, acrylated polyethers, urethanes, epoxies, acrylics, phenolics, cyanate esters, bismaleimides, hot melts like polyester, polyamides, polyolefins, derivatized polyolefins or combinations thereof.~~

7. The product of claim 1, wherein said adhesive is an acrylated aliphatic urethane.

8. The product of claim 1, wherein said cured adhesive does not adversely affect an aesthetic color of said ceramic coated granules as indicated by a one unit or more change in any HunterLab color scale coordinates of L\*, a\*, or b\*.

9. ~~The product of claim 1, wherein said ceramic coated granules are white and the product exhibits an L\* value of 64 or greater according to HunterLab spectrophotometer test procedures.~~

10. The product of claim 1, wherein said cured adhesive or said film includes toughening agents, pigments, adhesion promoters, dyes, filling agents, initiators, catalysts, antimicrobials, algaecides, ultraviolet stabilizers, ultraviolet absorbers, antioxidants or combinations thereof.

11. The product of claim 1, wherein said film includes a primer layer.

12. An integrated granule product suitable as an exposed surface layer for a roofing shingle construction, comprising a plurality of ceramic coated granules bonded to a self-supporting cured adhesive film.

13. The product of claim 12, wherein said cured adhesive is selected from acrylated urethanes, multifunctional acrylate monomers, acrylated epoxies, acrylated polyesters, acrylated polyethers, urethanes, epoxies, acrylics, phenolics, cyanate esters, bismaleimides, hot melts like polyester, polyamides, polyolefins, derivatized polyolefins or combinations thereof.

14. The product of claim 12, wherein said product is pliable as determined by mandrel flexibility test procedures according to ASTM D-228-00.

15. The product of claim 12, wherein said cured adhesive is flexible as indicated by a tensile elongation result of 25% or greater according to ASTM D-882.97.

16. The product of claim 12, wherein said cured adhesive film includes toughening agents, pigments, adhesion promoters, dyes, filling agents, initiators, catalysts, ultraviolet stabilizers, ultraviolet absorbers, antioxidants or combinations thereof.

17. An integrated granule product suitable as an exposed surface layer for a floor construction, comprising a plurality of ceramic coated granules bonded to a self-supporting cured adhesive film and a polymeric sealant coat applied over said plurality of ceramic coated granules.

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18. The product of claim 17, wherein said cured adhesive film is selected from acrylated urethanes, multifunctional acrylate monomers, acrylated epoxies, acrylated polyesters, acrylated polyethers, urethanes, epoxies, acrylics, phenolics, cyanate esters, bismaleimides, hot melts likes polyester, polyamides, polyolefins, derivatized polyolefins or combinations thereof.

19. The product of claim 17, wherein said cured adhesive is flexible as indicated by a tensile elongation result of 25% or greater according to ASTM D-882.97.

20. A method of making an integrated granule product, comprising bonding a plurality of ceramic coated granules to a film with a cured adhesive.

21. A method of making an integrated granule product, comprising:  
(a) providing a film;  
(b) coating a curable adhesive onto said film;  
(c) applying a plurality of ceramic coated granules onto the adhesive coated film;  
and  
(d) curing said curable adhesive to bond said plurality of ceramic coated granules to said film.

22. A method according to claim 21, wherein said curing occurs through the use of ultraviolet radiation, thermal radiation, actinic radiation, ionizing radiation, moisture activation, photo-activation or combinations thereof.

23. A method according to claim 21, wherein said curable adhesive is selected from acrylated urethanes, multifunctional acrylate monomers, acrylated epoxies, acrylated polyesters, acrylated polyethers, urethanes, epoxies, acrylics, phenolics, cyanate esters, bismaleimides, hot melts likes polyester, polyamides, polyolefins, derivatized polyolefins or combinations thereof.

24. A method according to claim 21, wherein said film is selected from polyethylene-terephthalate, or polypropylene.

25. A method according to claim 24, wherein said film includes a primer layer.

26. An article comprising, the integrated granule product of claim 1 bonded to a substrate.

27. The article of claim 26, wherein the substrate is an asphalt-based substrate, metal substrate, polymeric substrate, concrete substrate, tile substrate, fiber substrate, wood substrate or combinations thereof.

28. The article of claim 26, wherein the article is a roofing shingle or a roll of roofing material.

29. The article of claim 28, wherein said roofing shingle exhibits a tensile strength, according to American Roofing Manufacturers Association Test Index No. 2,126, of greater than 50% over a shingle without said integrated granule product.

30. The article of claim 26, wherein the article is floor covering.

31. The article of claim 30, further comprising a polymeric sealant applied over the article.

32. A method of producing a roofing product, comprising:  
providing the integrated granule product of claim 1,  
bonding the integrated granule product to a surface of a substrate.

33. A method according to of claim 32, wherein said bonding step includes :  
heating an asphalt-based substrate to soften the asphalt surface,  
contacting the integrated granule product with the softened asphalt surface,  
and

cooling the asphalt.

34. A method according to claim 32, wherein during the contacting step, the asphalt-based substrate is heated to a temperature in the range from about 150 °C to about  
5 250 °C, and the roofing product intermediate is provided at room temperature.

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